

LISTING OF CLAIMS

The listing of claims provided below replaces all prior versions, and listings, of claims in the application.

5 1. (Currently Amended) A method for estimating a chemical mechanical planarization (CMP) result, comprising:

 developing a neural network, wherein the neural network is configured to relate one or more CMP control parameters to a CMP result;

 training the neural network using data for the one or more CMP control
10 parameters and the CMP result; and

 using the neural network to estimate the CMP result of a subsequent CMP operation based on data to be applied in the subsequent CMP operation for the one or more CMP control parameters ~~to be applied in the subsequent CMP operation~~.

15 2. (Original) A method for estimating a CMP result as recited in claim 1, wherein the CMP result is obtained using a linear CMP apparatus.

 3. (Currently Amended) A method for estimating a CMP result as recited in claim 2, wherein the one or more CMP control parameters include an air bearing pressure
20 present between a platen and an underside of a polishing pad within a CMP system and a distance of the platen from the underside of the polishing pad ~~platen height~~, wherein the CMP result is a wafer uniformity profile.

 4. (Original) A method for estimating a CMP result as recited in claim 1,
25 wherein the neural network is a static neural network having an input layer, one hidden layer, and an output layer.

5. (Original) A method for estimating a CMP result as recited in claim 4,
wherein the one hidden layer includes a number of hidden neurons and the output layer
includes one output neuron, each of the number of hidden neurons having a hyperbolic
5 tangent activation function, the output neuron being represented by a linear function.

6. (Original) A method for estimating a CMP result as recited in claim 1,
further comprising:

10 selecting the data used for training the neural network from a design of
experiments used to qualify a CMP apparatus used to produce the CMP result, wherein
the data is selected to cover an anticipated range for the one or more CMP control
parameters and the CMP result.

7. (Original) A method for estimating a CMP result as recited in claim 1,
15 wherein the training of the neural network is based on an iterative minimization of an
estimation error function performed using an adaptation of weights of the neural network,
the adaptation of weights being based on a Levenberg-Marquardt algorithm.

8. (Currently Amended) A method for estimating a CMP result as recited in
20 claim 1, further comprising:

performing the subsequent CMP operation using the data to be applied in the
subsequent CMP operation for the one or more CMP control parameters;

updating weights of the neural network using the one or more CMP control
parameters applied in the subsequent CMP operation and the CMP result of the
25 subsequent CMP operation.

9. (Currently Amended) A method for adjusting control parameters of a chemical mechanical planarization (CMP) operation, comprising:

developing a neural network, wherein the neural network is configured to relate a comparison between a desired CMP result and an obtained CMP result to one or more
5 CMP control parameters associated with the obtained CMP result;

training the neural network using data for the desired CMP result, the obtained CMP result, and the one or more CMP control parameters associated with the obtained CMP result; and

using the neural network to determine values for the one or more CMP control
10 parameters to be used in a subsequent CMP operation such that the obtained CMP result for the subsequent CMP operation is acceptable relative to the desired CMP result,
wherein the one or more CMP control parameters to be used in the subsequent CMP operation are the same as the one or more CMP control parameters associated with the obtained CMP result.

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10. (Original) A method for adjusting control parameters of a CMP operation as recited in claim 9, wherein the CMP operation is a linear CMP operation.

11. (Currently Amended) A method for adjusting control parameters of a
20 CMP operation as recited in claim 10, wherein the one or more CMP control parameters associated with the obtained CMP result include an air bearing pressure present between a platen and an underside of a polishing pad within a CMP system and a distance of the platen from the underside of the polishing pad ~~platen height~~, the obtained CMP result and the desired CMP result corresponding to a wafer uniformity profile.

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12. (Original) A method for adjusting control parameters of a CMP operation as recited in claim 9, wherein the neural network is a static neural network having an input layer, one hidden layer, and an output layer.

5 13. (Original) A method for adjusting control parameters of a CMP operation as recited in claim 12, wherein the input layer includes the desired CMP result, the one hidden layer includes a number of hidden neurons, and the output layer includes an output for each of the one or more CMP control parameters.

10 14. (Cancelled)

15 15. (Original) A method for adjusting control parameters of a CMP operation as recited in claim 9, wherein the training of the neural network is performed using a recursive error back propagation method.

16-32. (Cancelled)